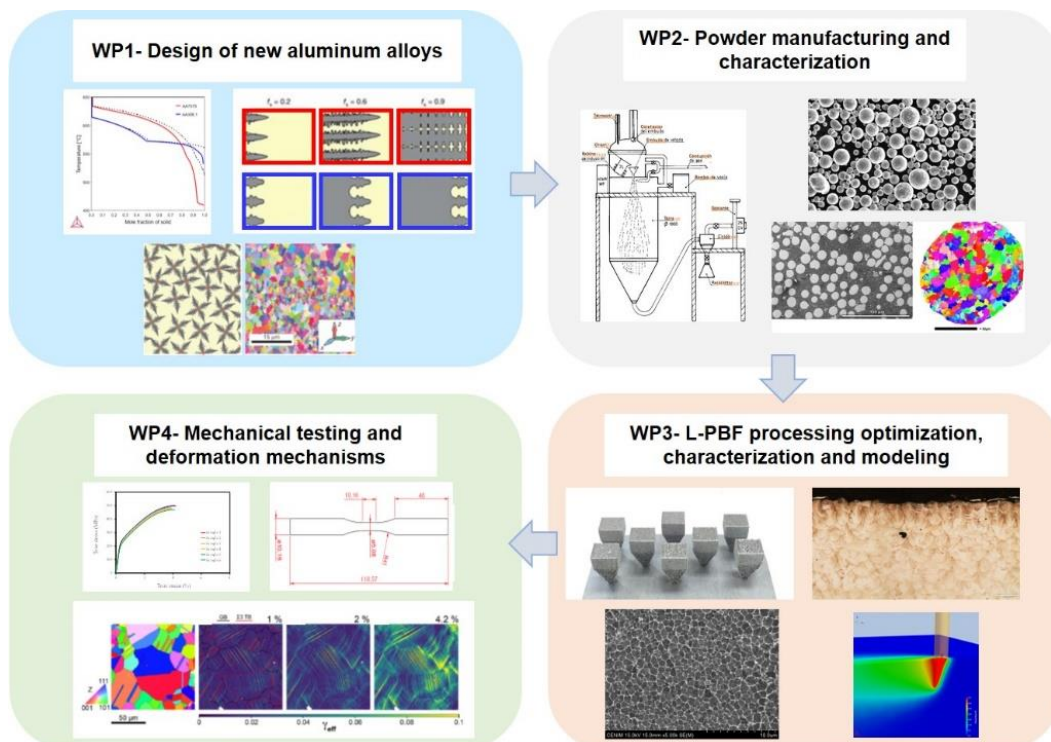


## PhD contract opportunity in new aluminium alloys suitable for additive manufacturing.

We are offering an FPI contract associated to “Proyectos de Generación de Conocimiento 2024” for a PhD thesis at **CENIM-CSIC**, Madrid. The project, entitled “*Development and MULTIScale characterization of aluminum alloys with high strength and ductility for Additive Manufacturing (MULTISAM) (PID2023-152337OB-I00)*” offers a unique opportunity to explore into innovative research on new compositions of **aluminium alloys for additive manufacturing**.

**Project Overview:** The main objective of the PhD project is to develop a new family of **high-strength and ductility aluminum alloys suitable for L-PBF** (laser powder bed fusion). A key issue will be to design the aluminum compositions to optimize the volume fraction of precipitates using **thermodynamic and kinetic aspects** applying predictive software like Thermo-Calc. In addition, combination of optimum set of L-PBF processing parameters, once identified and optimized, both experimentally and using finite element modeling, can help in development of tailored and optimum microstructures with **exceptional mechanical properties** for future applications. A multiscale microstructural characterization of as-built and heat-treated samples will be carried out using **advanced characterization techniques**, including electron microscopy (SEM/EBSD/TEM), X-ray diffraction, and mechanical testing (tension and fatigue testing). The main impact foreseen by this PhD project is to develop high strength and ductility aluminum alloys based on fundamental knowledge (capturing structure-processing- mechanical properties relationships), as a first step for the potential use of advanced 3D printing techniques, in particular laser-powder bed fusion (L-PBF).



The PhD student will receive on-the-job technical training based on the activities included in the proposal: (i) Materials design and Thermo-Calc software, specifically in Al alloys; (ii) Advanced Manufacturing processes, specifically in gas atomization and L-PBF, and (iii) Advanced characterization, including electron microscopy (SEM/EBSD/TEM/HR-DIC), X-Ray diffraction, and mechanical testing (tension, compression, and fatigue testing). These highly sought skills will open up career opportunities for the researcher in both academia and industry. Training will be completed with some courses given by the Department for Postgraduate and Specialization of CSIC, and stages in foreign reputed institutions in the field of additive manufacturing and physical metallurgy, which will be planned according with the necessities for accomplishing the objectives pursued in his/her thesis work. It is expected that the PhD work will give rise to several publications in peer-reviewed international journals and it will give the candidates the opportunity to present their work at major international conferences.

### **Recent Publications from Our Group:**

- Predicting grain size-dependent superplastic properties in friction stir processed ZK30 magnesium alloy with machine learning methods, *Journal of Magnesium and Alloys*, 12 (2024) 1931.
- Activation of pyramidal slip and other secondary mechanisms in solid solution Mg-Zn alloys and their effect on tensile ductility, *Acta Materialia*, 244 (2023) 118555.
- An AlFeCr alloy with outstanding high temperature mechanical behavior by laser powder bed fusion, *Additive Manufacturing*, 55 (2022) 102828.
- Influence of the Zr content on the processability of a high strength Al-Zn-Mg-Cu-Zr alloy by laser powder bed fusion, *Materials Characterization*, 183 (2022) 111650.

### **What We Are Looking For:**

- We seek a motivated researcher with initiative, a strong capacity for study, and a passion for science.
- She/he should have a degree (MSc or equivalent) in Materials Science, Metallurgy, Mechanical Engineering, Physics or a related discipline, with excellent academic credentials. Candidates with previous experience in processing and characterization of metallic materials and finite element modelling are strongly encouraged to apply.
- Good communication (oral and written) skills in English.

### **Conditions**

- 4 year full-time contract including social security coverage.



- The PhD student could enroll in the PhD program in Materials Science and Engineering of the Carlos III University or Polytechnic University of Madrid (UPM).
- The start date for this PhD contract is between January-March 2025.

### **Application Details:**

- Interested candidates should send a motivation letter and CV to [cm.cepeda@cenim.csic.es](mailto:cm.cepeda@cenim.csic.es).

This is an excellent opportunity to join a leading research team and contribute to impactful scientific discoveries. Join us at CENIM-CSIC and be a part of impactful research that could significantly advance our understanding of new compositions of aluminium alloys for additive manufacturing. We look forward to your application!